[0364]   a) determining consumption at a given time (x)

first order: $tr(x) = \alpha_0 \cdot x + \alpha_1$

n-th order: $tr(x) = \alpha_0 \cdot x^n + \alpha_1 \cdot x^{n-1} + \ldots + \alpha_{n-1} \cdot x + \alpha_n$

[0365]   b) measuring accuracy of an estimated trend line

$$ESS = \sum_{i=1}^{m} (tr(x_i) - c_i)^2 = C^T C - (X^T X)^{-1} X^T C X^T C$$

[0366]   A method of integrating the patterns before applying a trends analysis comprises:

[0367]   a) for k patterns and trends,

$^u\mu_x, {}^u s_x$: mean and standard deviation at time x for pattern u

$^v tr(x), {}^v ESS$: trend estimate and error at time x for trend v

$$\begin{cases} u: \text{pattern,} & {}^u p_x = {}^u \mu_x \\ u: \text{trend,} & {}^u p_x = {}^u tr(x) \end{cases}$$

$$w(x) = \sum_{v=1}^{k} \frac{1}{{}^v s_x}, \qquad P(x) = \sum_{u=1}^{k} \frac{{}^u p_x \cdot \frac{1}{{}^u s_x}}{w(x)}$$

wherein w(x) represents the total weight of all pattern forecasts at time x, and f(x) represents the final forecast value for all patterns/trends of the same time-resolution and wherein patterns/trends of varying resolution are converted to the lowest time-resolution:

$$p^\alpha = \{p_1^\alpha, p_2^\alpha, \ldots, p_N^\alpha\}, \quad \alpha: \text{resolution,}$$

β: new resolution, $\beta > \alpha$

$$\left\{ \forall i: (t-1) \cdot \frac{\beta}{\alpha} < x_i \le t \cdot \frac{\beta}{\alpha} \,\middle|\, {}^u p_t^\beta = \sum_i {}^u p_i^\alpha \right\}$$

$$P(x) = {}^{hi} p_x^\beta \cdot \frac{{}^{lo} p_x^\alpha}{{}^{lo} p_{t: (x \in t)}^\beta}$$

$$S_x^{\prime \alpha} = {}^{lo} s_x^\alpha \cdot \frac{{}^{lo} p_x^\alpha}{{}^{lo} p_{t: (x \in t)}^\beta}$$

[0368]   A method comprises the following steps:

[0369]   a) integrate all patterns of the highest resolution;

[0370]   b) integrate no patterns/trends at lower resolution;

[0371]   c) integrate all patterns at next highest resolution;

[0372]   d) convert patterns/trends of varying resolution to the lowest time-resolution; and

[0373]   e) repeat steps a) to d) until no low resolution patterns exists.

[0374]   Preferably, the utility receives information relating to detected consumption pattern changes and then directs notification to the user of at least one of messages selected from the group consisting in whole or part of:

[0375]   a grid within which home is located is experiencing an unusual over-consumption

[0376]   a request to user to turn off at least one power consuming device.

[0377]   Preferably, the utility company offers an incentive to user to turn off at least one power consuming device. Preferably, said incentive is selected from the group consisting of cash and prizes. Preferably, the processor is configured within a mobile computing device selected from the group consisting of a Smartphone, tablet, netbook and laptop, an In-Home Display (IHD) platform and a home-energy management device.

[0378]   Preferably, a mobile application runs on mobile computing device and enables operation of the method and wherein utility company and user interact via mobile application. Preferably, a mobile application runs on mobile computing device and enables operation of the method. Preferably, the notification of detected consumption pattern changes is conveyed via a communication interface selected from the group consisting of RS232, USB, Firewire™, Ethernet, Zigbee™, Wifi, Bluetooth™, RFJID, wireless USB, cellular, and WMAN communication technologies.

   1. A system for monitoring and analyzing electricity consumption in a home of a user, the home comprising multiple electricity consuming devices, the system comprising:
      one or more electricity sensors configured to measure electricity consumption at the home;
      a mobile computing device;
      a processor in the mobile computing device, configured to receive signals from the sensors; and
      a user interface on the mobile computing device;
   wherein the processor is configured to:
      determine individual electricity consumptions of the devices without there being a sensor on each device;
      identify a consumption change of one of the devices; and
      send a notification of the consumption change to the user interface.

   2. The system of claim 1, wherein the consumption change is a change from a usual consumption pattern.

   3. The system of claim 1, wherein the processor is further configured to:
      identify a consumption pattern change of the home;
      determine that the consumption pattern change represents an intrusion; and
      send a notification of said consumption pattern change to a security system.

   4. The system of claim 1, wherein the processor is further configured to:
      identify a consumption pattern change of the home; and
      send a notification of the consumption pattern change to the user interface.

   5. The system of claim 4, wherein the consumption pattern has a duration of a day or a week.

   6. The system of claim 5, wherein:
      when the consumption pattern has a duration of a day, the consumption pattern has a resolution of an hour; and
      when the consumption pattern has a duration of a week, the consumption pattern has a resolution of a day.

   7. The system of claim 1, wherein:
      the processor is further configured to determine that the consumption change represents a hazard; and
      the notification is informative of the hazard.